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A Comparative Study of Certain Characteristics of Thinking in Adult Aments and Normal Children.

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A COMPARATIVE STUDY OF CERTAIN CHARACTERISTICS OF THINKING IN ADULT AMENTS AND NORMAL CHILDREN

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
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in partial fulfillment of the
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ABSTRACT

It has long been recognized that the mind of a child is different from that of an adult. Psychological investigation has indicated that the nature of this distinction is largely one of mental power. Indeed, so well-grounded is the belief that mental power increases with age until adulthood that it is now customary to refer to individuals in terms of their "mental age," or age at which their mental level is customarily found. This concept is not only widely held in psychological circles, but it has become so generally accepted that our statutes and judiciary judgments refer frequently to the "six-year-old mind" or "nine-year-old mind."

This study was designed to investigate the characteristics of the thinking of individuals with five- and six-year-old minds, i.e., individuals whose mental ages are between five and seven years. Recent studies have suggested certain characteristic tendencies at these mental age levels, but these have been denied by some and attributed by others to years of experience. We have studied 84 individuals whose mental ages ranged from five to seven years, and whose chronological ages ranged from 4 years, 5 months to 45 years, 5 months. Some of the subjects were students in kindergartens and first grades of Baton Rouge, Louisiana; others were inmates of the State Colony and Training School, Alexandria, Louisiana. All factors which were adjudged capable of influencing thought tendencies were carefully controlled by selection of subjects and by statistical analysis.

The thinking of the subjects possessed these characteristics: animism, or tendency to impute life into the inanimate; juxtaposition, or tendency to adjoin clauses or ideas which are not logically related; lack of relativism, or inability to conceive of left-right relationships independent of one's own body as the center of reference; inability to abstract, or inability to shift reflectively from one aspect of a situation to another. These characteristics were a product of mental age level rather than of experience, for there was no improvement with increased chronological age when the mental age was constant. There seemed to be some qualitative difference between the adult aments and normal children. The former were inferior to a statistically significant degree on tests of juxtaposition and abstraction. This was not due to institutionalization, for the tendency was as marked among those individuals institutionalized a short time as it was among those individuals institutionalized a longer period of time.

It does not seem that increased age or increased experience will, in themselves, produce thought more like that of the normal adult. Rather, such thought can only be produced by the increase in mental age which normally occurs with increased chronological age. Otherwise, experience alone may even have a deleterious effect.

INTRODUCTION

A. Background and Setting

"When I was a child, I spoke as a child, I understood as a child, I thought as a child: but when I became a man, I put away childish things." These words from Paul's letter to the Corinthians represent a belief almost universally held in both ancient and modern cultures—that the thinking of a child is qualitatively distinct from that of an adult. But it has only been with the comparatively recent growth of genetic psychology that an attempt has been made to analyze the nature of these differences and to ascertain some of the chief factors involved in their production. It is probable that the outstanding factor thus far discovered is that of mental age. Individuals of widely differing mental ages have been demonstrated to differ widely in the nature of their intellectual activities. So universal has become the emphasis on this single factor that scientists and laymen alike speak of "an eight-year-old mind," or "the mind of a nine-year-old." Such a terminology suggests a strong similarity between the intellectual activity of individuals possessing the same mental age which is independent of the other factors involved. That is, two individuals of similar mental ages are assumed to be similar in ideational processes regardless of any differences which might exist with respect to such factors as chronological age. As far as we have been able to ascertain, however, the validity of this assumption has not yet been subjected to systematic investigation.

It appears, therefore, that further investigation of the thought

tendencies of "childish" minds would be profitable on several scores:

1. What tendencies characterize the thinking of individuals of a certain mental age level? In addition to the information about mental ability which knowledge of mental age can yield, there is the question of what thought tendencies can be attributed to individuals who possess a given mental capacity.

2. What influence does chronological age have upon the nature of these thought tendencies? This question points to the possibility that the added experience which accompanies an increase in chronological age might produce a difference in the nature of the individual's thinking, even though the mental age remained constant. Thus, it might be possible for individuals of equal mental ages to exhibit different tendencies in their thinking due to differences in chronological age. Inasmuch as amentia is a condition in which a certain type of relation exists between mental age and chronological age, it can readily be seen that this question would include investigation of differences between the thinking of aments and that of so-called "normals."

3. What interrelations exist between the various thought tendencies present at a given mental age level? This raises the question of whether certain tendencies go together, i.e., whether the presence of one thought tendency is associated with the presence of another in individuals whose mental age is equal. Associations would suggest that the tendencies stand causally related either to each other or to additional underlying factors.

B. Experimental Literature

In his review of the literature on animism Dennis (8) points out that "the peculiarities of childish thought" were noted at least as far back as the Greek era, and that a partial list of authors commenting on these phenomena would include Zenophanes, Hume, Tiedmann, Comte, and Taine. First attention from American psychologists seems to have come in the latter part of the nineteenth century. Several writers (3, 13, 33) mention the distinctive character of children's reasoning and record typical responses in anecdotal form. But the first systematic investigation seems to have been conducted by the French psychologist Jean Piaget, whose works (25, 26, 28) have served as a stimulus for much of the more recent study in this field.

The rather unique methods of Piaget probably would be classified by the student of scientific method as more intuitive than scientific. Indeed, he states in one place that he does not consider a controlled investigation of child thought to be a possibility: "...it is, in fact, impossible to observe a large number of children under similar conditions" (28, p.6). Instead he relies upon a combination of techniques including observation in play situations, clinical examination, and questioning. The data so obtained are assumed to be representative of children at large in spite of the fact that in many cases he studies fewer than a dozen subjects. No statistical techniques are employed other than the arithmetical practice of summarizing in the form of percentages and means. In the event that the citation of a certain case impresses the reader as atypical, he demonstrates its

representativeness by citing another case! It is not clear whether he believes the differences he observed in children's thinking to be due to mental age, chronological age, or both. He simply makes the statement that a six-year-old child, for example, possesses certain traits.

The general thesis of Piaget is that the thinking of a child of less than seven years is self-centered, non-social, ego-centric, and becomes progressively more socialized as the child grows older. The non-social nature of his thought produces in his verbal responses a myriad of characteristic tendencies such as animism, syncretism, artificialism, synthetic incapacity, juxtaposition, lack of relativism, irreversible reasoning. Particular emphasis is placed on the tendencies of animism, juxtaposition, and lack of relativism, for they demonstrate most clearly the ego-centric nature of responses. Furthermore, the characteristic of juxtaposition is almost identical with those of synthetic incapacity and syncretism. In general, animism is defined as the belief that certain objects or classes are alive; juxtaposition, as the tendency to juxtapose or adjoin ideas or classes that do not stand logically related; lack of relativism, the tendency to consider relations in which one may be involved (e.g., the relation of right-left) as dependent on one's self in every instance. It should be understood that, according to Piaget, the ego-centric thought of the child produces animism, juxtaposition, lack of relativism, et al, and that the presence of these tendencies is considered indicative of ego-centric thought.

Reaction to the publication of these observations was immediate and widespread. Textbooks on the subject of child psychology (7, 24) devoted their chapters on thinking to a discussion of Piaget's concepts. Isaacs (18) made a similar extended observation of children in her school, and found indications of the type of thought found in adults. This led her to the conclusion that the thinking of children is not qualitatively different from that of adults, but it is made to appear so by lack of experience. Piaget (27) answered that the apparent contradiction in conclusions arose from Isaacs' using a functional or prospective viewpoint as opposed to his own structural approach. That is, although the potentiality of adult thinking is present in children, their thought at any given time presents an observable structure that is quite distinct. Both Hazlitt (15) and Abel (1) supported Isaacs in the contention that distinctiveness of the thought of children could be attributed to a lack of experience. Many authors objected to the axiological connotation of the term "ego-centric," and endeavored to demonstrate that adults are as concerned with their egoes as are children. Henle and Hubbell (6), for example, conclude that "growing social consciousness does not imply a concomitant decrease of concern with self." These objections are probably irrelevant to the actual theses set forth by Piaget.

Numerous experiments have attempted to subject the observations of Piaget to an empirical check. One of the first of these was performed by Johnson and Josey (19), who sought to determine whether "animism, ego-centricity, or juxtaposition" were present in

six-year-old children. Their failure to find evidence of any of these is inexplicable in light of later experimentation unless it can be attributed to the methodology (unrecorded). In a study of subnormal children Lane and Kinder (21) found that questions involving relativism were handled progressively better as mental age increased. Although they pointed to the need for further work, the phenomenon seems to have been largely neglected since that time. Similarly, juxtaposition as indicated by an inability to use the conjunction "because" has attracted small notice. But the tendency of animism has recently received considerable attention.

Central in the studies of animism is the standardized procedure for its investigation which was perfected by Russell and Dennis (30). This procedure is outlined in some detail so that, with a little practice, another experimenter could follow it exactly. Data so obtained are classified into "stages of animism." These include the stages set forth by Piaget (25, 28) as characteristic of certain age levels. In addition to being well-outlined, this procedure enjoys the advantage of yielding classifications which are consistent from one judge to another, and relatively constant on retest. In a subsequent study Russell (29) found that children fell into different animism stages, but that the presence of a certain stage was not restricted to a single age. The factors of sex and rural versus urban background were demonstrated to possess no influence. Increasing mental and chronological age produced a definite progression in stage, but the relative influence of each of

these factors was not analyzed. In a follow-up of this study Russell, Dennis, and Ash (31) found that subjects of the same mental age but varying chronological ages were frequently at different animism stages. Although the tendency seemed to be for the older individuals to be at a more advanced stage than the younger, this tendency was not consistent for all groups tested, and was in some cases statistically insignificant. Inasmuch as precise information regarding the distribution of mental ages and chronological ages in the groups studied is not given, a definite single generalization regarding the effect of chronological age does not seem warranted. Bruce (4) made a study of animism among Negro and white children in the rural South, and concluded that they exhibited animistic tendencies, although an admittedly poor experimental technique prevents any extensive induction. In a study of concepts in schoolboys Granich (12) included a survey of animistic beliefs, which led him to the assertion that "the nature of the boy's general beliefs or his freedom from what Piaget calls 'prelogical' conceptions, for example animism, seems to depend upon his mental level rather than his age or experience." The application of the chi-square technique to his data reveal, however, that all differences discovered could have been due to chance.

In addition to the tendencies described by Piaget, at least one other characteristic difference between the thinking of adults and that of children has been under extensive investigation in recent years--namely, the process of abstraction. This process is said by Weigl to consist in "...either voluntarily or involuntarily singling out, i.e., 'abstracting the partial content,' from all the de facto

given contents" (37, p. 32). Goldstein and Scheerer (11) further point out that such activity manifests itself in certain modes of behavior, one of which lends itself quite easily to experimentation: the ability to shift reflectively from one aspect of a situation to another. Hanfmann and Kasanin (14) refer to this ability as a realization of the arbitrariness of classification and the multiple possibilities of same.

The studies of Weigl (37) and Goldstein and Scheerer (11) were centered largely around the question of differences between adults and patients with cerebral lesions. Thompson (36) studied the relation of generalizing or abstraction to school grade, and found that pupils in the fourth, fifth, and sixth grades were superior to those of the first, second, and third grades. In a study of both aments and normal children Holtzberg (17) concluded that the difference discovered by Thompson was probably due to differences in mental age. She found no difference between the capacity for generalizing which could be attributed to chronological age alone, except a slight tendency at some age levels for advanced chronological age to be accompanied by an actual lowering of score. This tendency was emphasized by Belles (2), who found that aments were inferior to normal children in ability to shift from one aspect of a situation to another. It should be noted, however, that she used only 10 subjects in each group.

In general, these studies indicate that thinking of children and adults differs with respect to ego-centricity, manifested by animism, juxtaposition, and lack of relativism, and to the process

of abstraction, manifested by ability to generalize and to shift from one aspect of a situation to another. The differences have been demonstrated to bear considerable relation to mental age; their relation to chronological age is not clear.

C. Statement of the Problem

It is the purpose of this investigation to study the characteristics of ego-centricity and abstraction in the thinking of individuals with a mental age between 5-1 and 6-11 (i.e., 5 years and 1 month and 6 years and 11 months). In conducting such a study, we shall investigate the phenomena from these standpoints:

1. The thought tendencies which are present at this mental age level.

2. The relation to chronological age of the tendencies which are present.

3. The interrelations of these tendencies.

SUBJECTS

A total of 84 subjects was used in this experiment. Their mental ages ranged from 5-1 to 6-11; their chronological ages from 4-5 to 45-5. Half of the subjects were inmates of the State Colony and Training School, Alexandria; half were students in private kindergarten and primary schools of Baton Rouge. Of the total, 43 were male and 41 female. Complete data on all subjects are given in Appendix I.

Special care was taken in the selection of subjects lest certain incidental variables enter into the experiment. Only white subjects were used. Individuals suffering from a language or speech deficiency, motor defect, or epilepsy were excluded from the study. Cooperativeness was also a criterion of selection.

The State Colony and Training School is situated about five miles northeast of Alexandria, Louisiana. It is a farm colony, and all mobile patients are encouraged to engage in some type of supervised work. There is a primary school on the campus where patients of some ability receive academic and manual training. While serving as extern in this institution, the experimenter was able, with the assistance of the chief psychologist, to find 42 patients who fulfilled the various requirements for selection. Only those diagnosed as "familial" or "undifferentiated" type were used. Of these 25 were female and 17 male. Their chronological ages ranged from 17-4 to 45-5 with the mean at 27.3. Their mental ages ranged from 5-1 to 6-11 with a mean of 6.07. The I.Q. range was from 34 to 46 with

the mean at 40.38. Records were kept of the age at which the patient was institutionalized and of the duration of the institutionalization. The mean age at institutionalization was 16.37, the range from 4-8 to 39-9. The mean duration of institutionalization was 10.97, the range from 2-10 to 20-0.

Of the non-institutionalized subjects, 18 were pupils of Mrs. George Platt's School of Modern Kindergarten and 24 were pupils of Mrs. Georgia Jones's First Grade. All were residents of Baton Rouge, Louisiana, a city of approximately 50,000 inhabitants. Of the 42 children used, 26 were male and 16 female. Their chronological ages ranged from 4-5 to 6-9 with the mean at 5.6. Their mental ages ranged from 5-2 to 6-10 with a mean of 6.23. The I. Q. range was from 92 to 136 with the mean at 112.5. The tuition at these private schools is not high enough to provide much selection of pupils on a socio-economic basis. Nevertheless, none of the patrons is from the lowest income bracket.

The question of motivation presented little difficulty. Every attempt was made to secure adequate rapport and to prevent the questions from assuming the nature of a task. The subjects seemed to enjoy the sessions and looked forward eagerly to additional ones. Outside of the examining room, the experimenter was frequently beset by children requesting interviews.

TECHNIQUES AND METHODS

A. Tests Employed

It has been stated above that the purpose of this experiment is to study the phenomena of ego-centricity, as manifested by animism, juxtaposition, lack of relativism, and of abstraction, as manifested by ability to generalize and to shift reflectively, in individuals of a mental age between 5-0 and 7-0. In order that such an investigation may be possible, it is necessary to define operationally each of the concepts employed. Some of our concepts, such as that of chronological age, have a generally accepted operational definition. The operation by which each of the others is measured is given below:

1. Mental age. The Terman-Merrill Revision of the Stanford Binet Intelligence Test, Form M, was used to obtain mental age. The manual of instructions (35) was followed closely. The experimenter had had considerable experience in the administration of this test, so it is highly probable that his technique was relatively consistent.

2. Animism. The standardized procedure of Russell and Dennis was used in the study of animism. The instructions for administration and scoring of the test were followed closely. The use of such a procedure enables one to classify individuals as belonging to one of six groups: those having no concept of living and dead (NC), those having a unique and special concept of living and dead (SC), those considering everything in good condition alive (Stage 1), those identifying motion with life (Stage 2), those be-

lieving life to consist in spontaneous motion (Stage 3), and those restriciting life to plants or animals (Stage 4). In this study the occurrence of special concepts, in addition to being quite rare, was found identified with an inconsistency of response which demonstrated the absence of any basis of judgment of living and dead. It was further found that some subjects considered everything presented to them alive unless it was damaged in their presence. For statistical purposes this stage (listed in Appendix I as "x") and the "special concept" stage were grouped with the "no concept" stage as exhibiting animism beliefs least socialized, i.e., least similar to those of adults. Stage 4, of course, was considered the most highly socialized.

3. Juxtaposition. The method for discovering the tendency of juxtaposition was suggested by that of Piaget, who said (26, pp. 15ff.):

> "If this phenomenon really lasts up till the age of 7-8, we must expect to find, even at this age, that when the children are asked to complete a sentence which implies a definite relation, there is a certain amount of confusion between the various possible relations. Only this element of confusion will prove that the relation was not implicit in the child's mind, and that the child was really incapable of establishing the correct relation.... Now, if the scarcity of the word 'because' up till the age of 7-8 is really proof that the child's mind is devoid of certain relations, experiment should reveal a whole series of confusions when the child is pressed to find the correct relation."

The subject was asked to complete each of five sentences read to him (see Appendix II-D), and the responses were recorded verbatim. The portion read to the subject always terminated with the word "because." At the beginning of the test, these instructions were

given:

> "Now I am going to say part of a sentence, and you finish it for me. I will say the first part, and you say the second part. You can finish it any way you want to."

Perseveration of response was not allowed. The responses were then scored on a basis of whether a causal relation existed between the statements given by the experimenter and the subject. Obviously, the frequency scores ranged from 0 to 5. The more frequent the instances of juxtaposition, the less socialized the thought was adjudged. No attempt was made to observe the consistency of juxtaposing responses on retest.

4. Relativism. The test of relativism, like that of Lane and Kinder (31), was taken from an experiment of Piaget. His "Right and Left" test (26, pp. 98ff.) was copied closely as to administration and scoring, with two exceptions. First, the entire test was given twice to insure against fortuitously correct differentiations between right and left. Second, a watch and a nickel were used instead of a key and a penny. This change was made in order to insure familiarity with the test objects. The scoring permits the classification of individuals into four groups. In Stage 0 there is no knowledge of right and left, or confusion of the two. In Stage 1 the subject knows his own left and right hands, but cannot point to the right or left hand of a person facing him. He is also unable to consider the relation in an abstract enough sense to recognize that an object which is between two others can simultaneously be

on the right of one and left of another. In Stage 2 the subject can identify his own left and right hands and those of a person facing him, but is still confused by three or more objects, which present the possibility of double relation. Subjects at Stage 3 have the adult conception of right and left.

5. Abstraction. A battery of tests was used to ascertain the presence or absence of the process of abstraction. Each of the tests is described below (the names of the tests are derived from the types of material used in them):

a. Beads. The materials for this test consisted of two small boxes, each size 2" x 2" x .75", and 16 beads. Eight beads were taken from the Stanford-Binet Test Material, Form M, and the other eight from Form L of the same test. The beads are used at the six-year level of each form. The beads from Form M were yellow; half were spherical and half, cubical. The beads from Form L were blue; half were spherical and half, cubical. This gave four yellow spheres, four blue spheres, four yellow cubes, four blue cubes. The beads were presented to the subjects in a pile, and the empty boxes placed beside them. These instructions were given:

> "See all those things? I want you to divide them up into two piles. Put one pile in one box and the other pile in the other box. Put all of them that belong together in one box, and all the others that go together in the other box."

If this was not clear the subject was coached:

"Put the ones that are just alike in the same box."

After the sorting was completed, the subject was asked to explain why he had put some in one box and the others in another box. If he failed to comprehend the question, he was asked the difference between the two piles. Then the boxes were emptied, and the beads presented a second time. These instructions were given:

> "Now do it again, but do it a different way this time. Put all those that go together in the same box, but do it another way."

If it became clear that the subject was sorting the beads in the same way, these supplementary instructions were given:

> "You did it that way last time. Last time you put the _____ ones in one box and the _____ ones in the other box. Do it differently this time. Divide them into two piles, but do it a different way."

Whenever the subject was unable to make a voluntary sorting, the experimenter sorted the beads for him and then asked the subject the basis of such sorting, or the difference between the two piles. Record was kept of the number of voluntary sortings the subject was able to make, and of the number of verbal interpretations of sorting he was able to make. The maximum possible score was two groupings and two interpretations.

b. Pencils. The materials for this test were obtained from ordinary five-cent hexagonal pencils. Red, yellow, and blue pencils were sawed into small sections. There were six pieces of each color. Half of these were 2½" long, and the other half were 1¼" long. Thus, there were three short blue pencil sections, three

long blue pencil sections, three short yellow sections, et cetera. The test procedure resembled that for the beads. The sections were presented to the subject in a pile and these instructions given:

> "See all of these things? I want you to divide them up into two piles. Put all of them that are just alike in one pile and the others that are just alike in the other pile."

If this was not clear, these supplementary instructions were given:

> "Put the ones that go together in the same pile."

When the sorting had been completed, the subject was asked to explain the basis of his sorting just as in the case of the beads. Then the pencil sections were presented a second time, and these instructions given:

> "Now do it again but do it a different way this time. This time divide them up into three piles. Put all of them that are just alike in one pile, the others that are just alike in another pile, and so on."

If the subject sorted on a basis of color the first time, the above instructions would be changed to read "into two piles" instead of "into three piles." If he began sorting in the same way that he did on the first trial, he was told:

> "No, that is the way you did it last time. This time divide them into _____ piles and do it a different way from the way you did it last time."

When the subject failed to make a possible sorting, the experimenter would make the correct sorting for him, thus giving each subject equal opportunity to interpret sortings. The maximum score was again two groupings and two interpretations.

c. *Figures.* The materials in this test were very similar to those

of the Weigl-Goldstein-Scheerer Color Form Sorting Test (11, p.110). Nine pasteboard figures were used. They could be classified on two bases: color and form. The colors used were red, yellow, black; the forms, circle, square, triangle. There were, therefore, one red circle, one yellow circle, one black circle, one red square, one yellow square, et cetera. The figures were identical in surface dimension with those of the Three-Hole Form Board of the Stanford Binet test material. The directions were very similar to those of the Read test:

> "See all these things? I want you to divide them up into three piles. Put all of them that are just alike in the same pile."

Supplementary assistance when needed:

> "Put the ones that go together in the same pile."

After asking for explanation of sorting (cf. bead and pencil tests), the figures were again presented. This time these instructions were given:

> "Now do it again, but do it a different way this time. Divide them up into three different piles."

If perseveration of the first sorting was evidenced, this was added:

> "No, you divided them up that way last time. Do it a different way this time."

Again the maximum score was two sortings and two interpretations.

d. Digits. At the seven-year level of the Stanford Binet Intelligence Test, Form M, test number four requires the subject to evidence ability to repeat digits in an order reversed from that in which they are presented to him. Since this tests the ability of a subject to shift reflectively, the results of this test were used

when subjects were advanced enough in mental age to be tested at this age level. The data were obtained directly from the test form; this item was in no case given independent of the entire Stanford Binet Test.

B. Method

In general, we have attempted to select the major factors to which thought tendencies might be related and either to control these factors by holding them constant in the experiment or to ascertain their influence by statistical analysis. By these techniques it was possible to use all factors except chronological age as independent variables, and thus to study the effect of the isolated dependent variable: chronological age. Demonstration of the controlled nature of the independent variables is given below:

1. Motor defects. No subject was used who suffered from a motor defect which was serious enough to be observed by the examiner.
2. Language deficiency. Individuals suffering from any type of language deficiency were excluded. This included deficiencies due to hearing difficulties, speech disorders, and lack of familiarity with the English language.
3. Epilepsy. No epileptics were knowingly included in the study. Diagnoses and health reports were sources of this information at the Colony. Teachers' testimony furnished these data on the school children.
4. Color blindness. All subjects were examined for color vision

following the administration of the regular test program. No standard color vision test was given; the subjects were merely examined as to ability to differentiate yellow, blue, and red. No more accurate differentiation was required for the successful execution of the test program tasks.

5. Residence. All subjects were natives of the State of Louisiana. The exact location and nature of the home communities varied widely within the range afforded by this State.

6. Examiner. The experimenter administered all tests to all subjects. He practiced each of them extensively before beginning the program, so it is highly probable that the technique of administration was fairly constant.

7. Mental age. All subjects had mental ages between 5-0 and 7-0; the range was 5-1 to 6-11. It was, therefore, believed that this factor had been controlled rather well. However, additional precaution was taken by dividing all mental age scores into two groups: those from 5-1 to 6-3 and those from 6-4 to 6-11. The chronological age scores were then divided into five groups: Group A, chronological age 4-5 to 5-7; Group B, 5-8 to 6-9; Group C, 17-4 to 23-1; Group D, 23-2 to 28-1; Group E, 28-2 to 45-5. The chi-square test was then applied to ascertain whether the higher mental age scores (within the range used) were distributed through the chronological age groups in a manner which deviated from a chance distribution. As can be seen from Table I, there was no consistent tendency in any direction, and the chi-square

was too small to be statistically significant. For a 4 x 2 table a chi-square of 11.74 indicates a probability of more than 0.01, and throughout this experiment a probability of 0.01 or less is looked upon as statistically significant. We can, therefore, conclude that the higher mental age scores are distributed randomly through the various chronological age groups. Thus, any differences or lack of differences in egocentricity or abstraction scores which may be found between different chronological age groups cannot be attributed to differences in mental age scores of those groups.

8. Sex. To determine whether the two sexes were randomly distributed through the chronological age groups, a distribution table was constructed (Table II). Statistical analysis yields a chi-square of only 7.25, which would give a probability greater than 0.10. It can, therefore, be concluded that the two sexes are distributed through the chronological age groups in a manner explicable by chance alone, so that differences between thought tendencies of these groups cannot be attributed to differences in sex. It may be repeated at this point that the sexes are almost equally represented in this study: 43 males and 41 females.

9. Institutionalization. All of the subjects with chronological ages above 17 years were inmates of an institution, and there was the possibility that this factor influenced the scores obtained. If so, then certain differences in thought tendencies

TABLE I

Distribution of Higher M.A. Scores through C.A. Groups

Mental Age	Chronological Age Group					Total
	A	B	C	D	E	
6-4 or above	6 (10)	16 (11)	8 (7)	9 (7)	4 (7)	43
X^2=	1.60	2.27	0.14	0.57	1.29	
6-3 or below	14 (10)	6 (11)	6 (7)	5 (7)	10 (7)	41
X^2=	1.60	2.27	0.14	0.57	1.29	
Total	20	22	14	14	14	84

ΣX^2 is 11.74; Probability is between 0.05 and 0.01

Group A includes C.A.'s between 4-5 and 5-7
Group B includes C.A.'s between 5-8 and 6-9
Group C includes C.A.'s between 17-4 and 23-1
Group D includes C.A.'s between 23-2 and 28-1
Group E includes C.A.'s between 28-2 and 45-5

TABLE II

Distribution of Sexes through C.A. Groups

Sex	Chronological Age Group					Total
	A	B	C	D	E	
Male	11 (11)	15 (11)	8 (7)	5 (7)	4 (7)	43
X^2=	0	1.45	0.14	0.57	1.29	
Female	10 (10)	6 (10)	6 (7)	9 (7)	10 (7)	41
X^2=	0	1.60	0.14	0.57	1.29	
Total	21	21	14	14	14	84

ΣX^2 is 7.25; Probability is greater than 0.10

Group A includes C.A.'s between 4-5 and 5-7
Group B includes C.A.'s between 5-8 and 6-9
Group C includes C.A.'s between 17-4 and 23-1
Group D includes C.A.'s between 23-2 and 28-1
Group E includes C.A.'s between 28-2 and 45-5

might be due either to institutionalization or to chronological age. In order to eliminate this factor, it would first be necessary to divide it into its components, namely, length of time spent outside of the institution (age at institutionalization) and duration of institutionalization. Then, a study could be made to ascertain whether individuals who were younger when institutionalized made different scores from those older when institutionalized, and to ascertain whether individuals institutionalized a shorter time made scores different from those institutionalized longer times. In Tables III, IV, V, VI, and VII an attempt is made to determine whether advanced age at institutionalization is associated with "higher" scores (those more closely resembling the scores of normal adults) in any one of the thought tendencies. In every case the low chi-square indicates a lack of relationship. It therefore appears that the age at which a subject was placed in an institution was not a factor determining his scores. In studying the effect of duration of institutionalization, particular care was demanded because of the obvious relationship between the duration of institutionalization and chronological age. In order to eliminate as much as possible of the influence of chronological age, only cases with ages between 17-4 and 26-11 were used. There remained a considerable range in duration of institutionalization: 2-10 to 17-10. With this group as a universe or statistical unit, Tables VIII, IX, X, XI, XII demonstrate the association

TABLE III

The Relation of Age at Institutionalization to Animism Scores

Animism Score	Chronological Age at Institutionalization		Total
	15-10 or below	15-11 or above	
0 or 1	11 (10.5)	10 (10.5)	21
X^2=	0.02	0.02	
2, 3, or 4	10 (10.5)	11 (10.5)	21
X^2=	0.02	0.02	
Total	21	21	42

ΣX^2 is 0.08; Probability is approximately 0.75

TABLE IV

The Relation of Age at Institutionalization to Frequency of Juxtaposition

Frequency of Juxtaposition	Chronological Age at Institutionalization		Total
	15-10 or below	15-11 or above	
0, 1, or 2	13 (11)	9 (11)	22
$X^2=$	0.36	0.36	
3, 4, or 5	8 (10)	12 (10)	20
$X^2=$	0.40	0.40	
Total	21	21	42

$\leq X^2$ is 1.52; Probability is approximately 0.25

TABLE V

The Relation of Age at Institutionalization to Relativism Score

Relativism Score	Chronological Age at Institutionalisation		Total
	15-10 or below	15-11 or above	
0	3 (4)	5 (4)	8
X^2=	0.25	0.25	
1 or 2	18 (17)	16 (17)	34
X^2=	0.06	0.06	
Total	21	21	42

$\leq X^2$ is 0.62; Probability is approximately 0.50

TABLE VI

The Relation of Age at Institutionalization to Abstraction Score

Abstraction Score	Chronological Age at Institutionalization		Total
	15-10 or below	15-11 or above	
Less than 1-2*	10 (8)	6 (8)	16
X^2=	0.50	0.50	
1-2 or More*	11 (13)	15 (13)	26
X^2=	0.21	0.21	
Total	21	21	42

ΣX^2 is 1.42; Probability is approximately 0.25

*Subjects making a minimum of one grouping on each abstraction test and able to verbalize the basis of both groupings on each test when confronted with them, were scored as "1-2 or More." All others were scored as "Less than 1-2."

TABLE VII

The Relation of Age at Institutionalization to Score on Digits Test

Score on Digits Test	Chronological Age at Institutionalization		Total
	15-10 or below	15-11 or above	
Passed	1 (1)	1 (1)	2
$\chi^2=$	0	0	
Failed	13 (13)	15 (15)	28
$\chi^2=$	0	0	
Total	14	16	30

$\leq\chi^2$ is 0; Probability is approximately 0.75

TABLE VIII*

The Relation of Duration of Institutionalization to Animism Score

Animism Score	Duration of Institutionalization		Total
	Less than 9 Years	More than 9 Years	
0 or 1	2 (5)	8 (5)	10
$\bar{x}^2$ =	1.80	1.29	
2, 3, or 4	10 (7)	5 (8)	15
$\bar{x}^2$ =	1.29	1.13	
Total	12	13	25

Σx^2 is 5.51; Probability is greater than 0.01

* In Tables VIII and XII only those subjects with chronological ages from 17-4 to 26-11 are used.

TABLE IX

The Relation of Duration of Institutionalization to Frequency of Juxtaposition

Juxtaposition Frequency	Duration of Institutionalization		Total
	Less than 9 years	More than 9 years	
0 or 1	7 (6)	4 (5)	11
$\chi^2=$	0.17	0.20	
2,3,4, or 5	6 (7)	8 (7)	14
$\chi^2=$	0.14	0.14	
Total	13	12	25

$\Sigma\chi^2$ is 0.65; Probability is greater than 0.35

TABLE I

The Relation of Duration of Institutionalization to Relativism Score

Relativism Score	Duration of Institutionalization		Total
	Less than 9 years	More than 9 years	
0	1 (2)	2 (1)	3
X^2=	0.50	1.00	
1 or 2	12 (11)	10 (11)	22
X^2=	0.09	0.09	
Total	13	12	25

$\leq X^2$ is 1.68; Probability approximately 0.25

TABLE XI

The Relation of Duration of Institutionalization to Abstraction Score

Abstraction Score	Duration of Institutionalization		Total
	Less than 9 years	More than 9 years	
Less than 1-2	4 (5)	5 (4)	9
X^2=	0.20	0.25	
1-2 or More	9 (8)	7 (8)	16
X^2=	0.125	0.125	
Total	13	12	25

ΣX^2 is 0.70; Probability is approximately 0.50

TABLE XII

The Relation of Duration of Institutionalization to Score on Digits Test

Score on Digits Test	Duration of Institutionalization		Total
	Less than 9 years	More than 9 years	
Passed	1 (1)	1 (1)	2
$X^2=$	0	0	
Failed	9 (9)	8 (8)	17
$X^2=$	0	0	
Total	10	9	19

ΣX^2 is 0; Probability is approximately 0.75

between shorter periods of institutionalization and "higher" scores on each of the thought tendencies. The low chi-squares indicate that this relation is no greater than a chance one. It can, therefore, be concluded that the duration of institutionalization is not a significant factor in determining the occurrence of higher scores on various tests of thought tendencies.

10. Type of amentia. Of the subjects who were patients at the State Colony and Training School, only those diagnosed as "familial" or "undifferentiated" type were used. This excluded the various types of clinical amentia.

From the above discussion it will be seen that the chief uncontrolled or dependent variable in this experiment is chronological age. There may be other dependent variables which have been overlooked, but every experiment requires some assumption regarding the nature and number of relevant factors. As Cohen and Nagel point out in their discussion of experimental inquiry (6, pp. 250, 253):

> "When the problematic situation is complex, and contains distinguishable factors as components, we can establish an invariable relation between the effect and some of the possible causal factors only by showing that such factors do or do not meet this formal condition for invariable connection. It is necessary, therefore, to vary the supposedly relevant factors one at a time, and consequently to analyze the situation into factors that are relatively independent of one another .....The method cannot possibly function unless, once more, assumptions about relevant factors are made."

RESULTS

A. Thought Tendencies Present at this Mental Age Level

1. Animism. Of the 84 individuals with mental ages between 5-0 and 7-0, not less than five were found at any one of the five stages of animism. That is, some subjects were at each of the stages. There were, however, certain definite tendencies, as can be seen from Table XIII. Stages 0, 1, and 2 seemed to be more common; eighty-six per cent of the cases were at these levels. There was no marked tendency for any one of these three stages to be more frequently found.

2. Juxtaposition. Two-thirds of the subjects manifested at least one instance of juxtaposition in the five-part test. Nearly half of the subjects gave two juxtaposed responses in five trials. It, therefore, appears that the inability to use properly the word "because" is a definite tendency at this level.

3. Relativism. Sixty-three per cent of these subjects were at Relativism Stage 1; none of them were at Stage 3. As is shown in Table XV, ninety-four per cent of the subjects were at one of the two lowest stages. It, therefore, seems clear that there is a tendency at this mental age level toward a low stage of relativism.

4. Abstraction: Pencils, Figures, and Beads Test. On each of these tests there was a marked uniformity of score. A large

TABLE XIII

Distribution of Subjects with Reference to Stages of Animism

Animism Stage	Frequency	Per Cent of Total	Cumulative Frequency	Cumulative Per Cent
0	24	29	24	29
1	17	20	41	49
2	31	37	72	86
3	5	6	77	92
4	7	8	84	100

TABLE XIV

Distribution of Subjects with Reference to Juxtaposition Frequency

Juxtaposition Frequency	Frequency	Per Cent of Total	Cumulative Frequency	Cumulative Per Cent
0	28	33	28	33
1	18	22	46	55
2	16	19	62	74
3	12	14	74	88
4	9	11	83	99
5	1	1	84	100

TABLE XV

Distribution of Subjects with Reference to Relativism Stage

Relativism Stage	Frequency	Per Cent of Total	Cumulative Frequency	Cumulative Per Cent
0	26	31	26	31
1	53	63	79	94
2	5	6	84	100
3	0	0	84	100

TABLE XVI

Distribution of Subjects with Reference to Score on Pencils Test

Number of Groupings	Frequency	Per Cent of Total
0	1	1
1	73	87
2	10	12
Number of Verbal Interpretations	**Frequency**	**Per Cent of Total**
0	0	0
1	13	15
2	71	85

TABLE XVII

Distribution of Subjects with Reference to Score on Figures Test

Number of Groupings	Frequency	Per Cent of Total
0	4	5
1	54	64
2	26	31
Number of Verbal Interpretations	**Frequency**	**Per Cent of Total**
0	0	0
1	15	18
2	69	82

TABLE XVIII

Distribution of Subjects with Reference to Score on Beads Test

Number of Groupings	Frequency	Per Cent of Total
0	1	1
1	71	85
2	12	14
Number of Verbal Interpretations	**Frequency**	**Per Cent of Total**
0	0	0
1	12	14
2	72	86

majority made one voluntary grouping and two verbal interpretations of groupings on each of the tests. Scores were slightly higher on the Figures Test, which was always the last administered. As may be seen from Tables XVI, XVII, and XVIII, there were few subjects who could not group the test objects on at least one basis, and none who were unable to verbalize the basis of at least one grouping that was set before them.

5. Abstraction: Digits Test. Of the 69 subjects passing an item at the seven-year level of the Binet Test, 21 passed the Digits Test and 48 failed it. In view of the mental ages of the subjects, this result seems merely to corroborate the judgment of those who selected this test as an item at the seven-year mental age level.

B. Relation of these Thought Tendencies to Chronological Age

In an effort to ascertain whether there was a relationship between any of these thought tendencies and chronological age which was not due to chance, tables were constructed to show the distribution of the higher test scores through the chronological age groups. The chi-square technique of statistical analysis was then applied, with these results:

1. Animism. There is no relationship between chronological age and stage of animism which cannot be explained as a chance relation (see Tables XIX and XX).

TABLE XIX

The Relation of Stage of Animism to Chronological Age

Animism Stage	Chronological Age Group					Total
	A	B	C	D	E	
0 or 1	11 (10)	9 (11)	3 (7)	8 (7)	10 (7)	41
X^2=	0.10	0.36	2.29	0.14	1.29	
2, 3, or 4	9 (10)	13 (11)	11 (7)	6 (7)	4 (7)	43
X^2=	0.10	0.36	2.29	0.14	1.29	
Total	20	22	14	14	14	84

$\leq X^2$ is 8.36; Probability is between 0.10 and 0.05

TABLE XX

The Relation of Stage of Animism to Amentia

Animism Stage	Children	Ments	Total
0 or 1	20 (20.5)	21 (20.5)	41
X^2=	0.01	0.01	
2, 3, or 4	22 (21.5)	21 (21.5)	43
X^2=	0.01	0.01	
Total	42	42	84

ΣX^2 is 0.04; Probability is greater than 0.75

TABLE XXI

The Relation of Frequency of Juxtaposition to Chronological Age

Juxtaposition Frequency	Chronological Age Group					Total
	A	B	C	D	E	
0 or 1	16 (11)	18 (12)	6 (8)	5 (8)	1 (8)	46
X^2=	2.27	3.00	0.50	1.13	6.13	
2,3,4,or 5	4 (9)	4 (10)	8 (6)	9 (6)	13 (6)	38
X^2=	2.78	3.60	0.67	1.50	8.17	
Total	20	22	14	14	14	84

ΣX^2 is 29.75; Probability is less than 0.0001

TABLE XXII

The Relation of Frequency of Juxtaposition to Amentia

Juxtaposition Frequency	Children	Aments	Total
0 or 1	34 (23)	12 (23)	46
X^2=	5.26	5.26	
3,4,or 5	8 (19)	30 (19)	38
X^2=	6.37	6.37	
Total	42	42	84

ΣX^2 is 23.26; Probability is approximately 0.0001

TABLE XXIII

The Relation of Relativism Stage to Chronological Age

Relativism Stage	Chronological Age Group					Total
	A	B	C	D	E	
0	9 (6)	9 (7)	1 (4)	2 (4)	5 (4)	26
X^2=	1.50	0.57	2.25	1.00	0.25	
1 or 2	11 (14)	13 (15)	13 (10)	12 (10)	9 (10)	58
X^2=	0.64	0.27	0.90	0.40	0.10	
Total	20	22	14	14	14	84

$\geq X^2$ is 7.38; Probability is approximately 0.10

TABLE XXIV

The Relation of Relativism Stage to Amentia

Relativism Stage	Children	Aments	Total
0	18 (13)	8 (13)	26
X^2=	1.92	1.92	
1 or 2	24 (29)	34 (29)	58
X^2=	0.86	0.86	
Total	42	42	84

$\geq X^2$ is 5.56; Probability is between 0.05 and 0.01

TABLE XXV

The Relation of Abstraction Score to Chronological Age

Abstraction Score	Chronological Age Group					Total
	A	B	C	D	E	
1-2 or less	8 (12)	11 (13)	9 (8)	10 (8)	12 (8)	50
X^2=	1.33	0.31	0.13	0.50	2.00	
More than 1-2	12 (8)	11 (9)	5 (6)	4 (6)	2 (6)	34
X^2=	2.00	0.44	0.17	0.67	2.67	
Total	20	22	14	14	14	

$\leq X^2$ is 10.22; Probability is 0.05 to 0.01

TABLE XXVI

The Relation of Abstraction Score to Amentia

Abstraction Score	Children	Aments	Total
1-2 or less	19 (25)	31 (25)	50
X^2=	1.44	1.44	
More than 1-2	23 (17)	11 (17)	34
X^2=	2.12	2.12	
Total	42	42	84

$\leq X^2$ is 7.12; Probability is approximately 0.01

TABLE XXVII

The Relation of Score on Digits test to Chronological Age

Digits Test	Chronological Age Group			Total
	A	B	C, D, and E*	
Passed	7 (5)	12 (7)	2 (9)	21
X^2=	0.80	3.57	5.44	
Failed	10 (12)	10 (15)	28 (21)	48
X^2=	0.33	1.67	2.33	
Total	17	22	30	69

$\geq X^2$ is 14.14; Probability is approximately 0.001

*Chronological Age Groups C, D, and E were grouped together to obtain a theoretical frequency large enough to make the X^2 reliable.

2. Juxtaposition. There was a statistically significant tendency for the aments to exhibit juxtaposition more frequently than the children (Table XXII). The aments of more advanced chronological ages were significantly more likely to exhibit the tendency than those of less advanced chronological ages (Table XXI).

3. Relativism. There was no statistically significant relationship between stage of relativism and chronological age, as may be seen from Tables XXIII and XXIV.

4. Abstraction Score: Pencils, Figures, and Beads Tests. There was no significant relation between the five chronological age groups and score on these tests. However, there was a relationship between amentia and lower scores which could not be attributed to chance. Thus, the children tended to excel in the tests of abstraction to a degree that may be looked upon as statistically reliable (Table XVI).

5. Abstraction Score: Digits Test. There was a significantly strong tendency for the children to excel the aments on this particular test. Indeed, only 2 of 30 aments were able to pass the test, while 19 of 39 children were successful (Table XXVII).

C. Interrelation of Thought Tendencies when Mental Age is Constant

Since all of these tests have been demonstrated to bear considerable relation to mental age, any study of their interrelations

TABLE XXVIII

The Relation of Stage of Animism to Frequency of Juxtaposition

Animism Stage	Juxtaposition Frequency		Total
	0 or 1	2,3,4, or 5	
0 or 1	19 (23)	22 (18)	41
X^2=	0.70	0.89	
2,3, or 4	27 (23)	16 (20)	43
X^2=	0.70	0.80	
Total	46	38	84

$\leq X^2$ is 3.09; Probability is approximately 0.10

TABLE XXIX

The Relation of Stage of Animism to State of Relativism

Animism Stage	Relativism Stage		Total
	0	1 or 2	
0 or 1	16 (13)	25 (28)	41
X^2=	0.69	0.32	
2,3, or 4	10 (13)	33 (30)	43
X^2=	0.69	0.30	
Total	26	58	84

$\leq X^2$ is 2.00; Probability is approximately 0.10

TABLE XXX

The Relation of Stage of Animism to Abstraction Score

Animism Stage	Abstraction Score		Total
	1-2 or Less	More than 1-2	
0 or 1	24 (24)	17 (17)	41
X^2=	0	0	
2, 3, or 4	26 (26)	17 (17)	43
X^2=	0	0	
Total	50	34	84

$\leq X^2 = 0$; Probability is approximately 0.75

TABLE XXXI

The Relation of Stage of Animism to Score on Digits Test

Animism Stage	Score on Digits Test		Total
	Passed	Failed	
0 or 1	8 (9)	22 (21)	30
X^2=	0.11	0.05	
2, 3, or 4	13 (12)	26 (27)	39
X^2=	0.09	0.04	
Total	21	48	69

$\leq X^2$ is 0.29; Probability is approximately 0.75

TABLE XXXII

The Relation of Frequency of Juxtaposition to Relativism Stage

Juxtaposition Frequency	Relativism Stage		Total
	0	1 or 2	
0 or 1	16 (14)	30 (32)	46
X^2 =	0.26	0.13	
2, 3, 4, or 5	10 (12)	28 (26)	38
X^2 =	0.33	0.15	
Total	26	58	84

$\leq X^2$ is 0.87; Probability is approximately 0.50

TABLE XXXIII

The Relation of Frequency of Juxtaposition to Abstraction Score

Juxtaposition Frequency	Abstraction Score		Total
	1-2 or Less	More than 1-2	
0 or 1	25 (27)	21 (19)	46
X^2 =	0.15	0.21	
2, 3, 4, or 5	25 (23)	13 (15)	38
X^2 =	0.17	0.27	
Total	50	34	84

$\leq X^2$ is 0.80; Probability is approximately 0.40

TABLE XXXIV

The Relation of Frequency of Juxtaposition to Score on Digits Test

Juxtaposition Frequency	Score on Digits Test		Total
	Passed	Failed	
0 or 1	16 (13)	27 (30)	43
$X^2=$	0.69	0.30	
2, 3, 4, or 5	5 (8)	21 (18)	26
$X^2=$	1.13	0.50	
Total	21	48	69

$\leq X^2$ is 2.62; Probability is greater than 0.25

TABLE XXXV

The Relation of Relativism Stage to Abstraction Score

Relativism Stage	Abstraction Score		Total
	1-2 or less	More than 1-2	
0	14 (15)	12 (11)	26
$X^2=$	0.07	0.09	
1 or 2	36 (35)	22 (23)	58
$X^2=$	0.03	0.04	
Total	50	34	84

$\leq X^2$ is 0.23; Probability is approximately 0.75

TABLE XXXVI

The Relation of Relativism Stage to Score on Digits Test

Relativism Stage	Score on Digits Test		Total
	Passed	Failed	
0	7 (6)	14 (15)	21
X^2 -	0.17	0.07	
1 or 2	14 (15)	34 (33)	48
X^2 -	0.07	0.03	
Total	21	48	69

$\leq X^2$ is 0.34; Probability is approximately 0.75

TABLE XXXVII

The Relation of Abstraction Score to Score on Digits Test

Abstraction Score	Score on Digits Test		Total
	Failed	Passed	
1-2 or less	30 (26)	8 (12)	38
X^2 -	0.62	1.33	
More than 1-2	18 (22)	13 (9)	31
X^2 -	0.73	1.78	
Total	48	21	69

$\leq X^2$ is 4.46; Probability is between 0.05 and 0.01

made without holding this factor constant would be subject to an obvious fallacy. Similarly, a study of their interrelations which held this factor constant should reveal whether there was any common trait or relation other than that of mental power. Tables XXVIII through XXXVII show the relationship between high scores on each pair of tests used, and further set forth the probability that such relations are due to chance. In no instance was there a relationship marked enough to be statistically significant. The only pair of tests related to a degree approaching significance was the two types of Abstraction Tests. It therefore seems that a high score on one of the tests employed is not necessarily accompanied by a high score on another of the tests when the influence of mental age is excluded.

SUMMARY

1. Animism. Individuals at this mental age level show definite tendencies toward animism as revealed by the technique of Russell and Dennis (30). Only eight per cent of these subjects were at the level of the average adult. However, no single stage was found to predominate to any marked degree. Thus, although these findings are in harmony with those of Piaget in that animism is found to be present, they agree with the more recent studies (4, 12, 29) on the contention that individuals of a given mental age are not exclusively at any stage. The animistic tendency seems largely due to mental age, since an increase in chronological age is not accompanied by a change in stage when the mental age level is constant. This independence of experience is in keeping with the belief of Granich (12) and with the findings of Russell, Dennis, and Ash (31) at the lower mental age levels. It is opposed to the theories of Abel (1), Hazlitt (15), and Isaacs (18), who endeavored to explain the observations of Piaget in terms of years of experience.

2. Juxtaposition. These subjects showed a marked tendency to use the word "because" incorrectly in a sentence, thereby demonstrating a lack of clear understanding of causal relationship. This is contrary to the findings of Johnson and Josey (19), who found no evidence of this tendency at the six-year level. The inability to handle this relationship verbally is more marked among aments than among children, and more marked among older

than younger ments. Experience, instead of clarifying the concept and increasing the ability to handle the term, seems to have a deleterious effect. The results here suggest that "...unto him that hath shall be given...but from him that hath not shall be taken away even that which he hath."

3. Relativism. It may have been due in part to the smaller number of stages, but there was a stronger tendency for the subjects to be at a single stage on this than on either of the preceding tests. At this mental level very few individuals seem capable of distinguishing right-left positions other than those relating to the members of their own bodies. This inability to assume an impersonal standpoint seems largely a product of mental age, for it bore no relation to chronological age within the 41-year range studied.

The lack of relationship between high scores on the various tests of autistic thought (animism, relativism, juxtaposition) suggests a point not hitherto emphasized, viz., that either there is no general autistic tendency or else it is not manifested consistently in the tests in which it has been sought to date. Thus, if animism stage and relativism stage are both reliable tests of autistic thinking, then it is highly improbable that a group of individuals at a low animism stage should be only randomly distributed through the relativism stages. Since this is, in effect, what was found, serious doubt is cast upon one or more of the assumptions. And the most vulnerable one

seems to be that of a general autistic tendency which is accurately tested by these techniques. The previously discovered relationship between these tendencies may be explained most easily on a basis of mental age alone.

4. Abstraction. In general, the subjects seemed to experience some difficulty in shifting voluntarily from one aspect of a situation to another, although they could explain the bases of groupings after they had been shifted by the experimenter. As has been suggested by Holtzberg (17), this inability to execute a voluntary shift is probably a result of the mental age level. The aments were significantly poorer than the children on both the sorting and digits test. This substantiates the belief of Bolles (2) that aments are inferior to normal children in ability to "abstract," or to make a voluntary shift from one aspect of a situation to another. This inferiority is most marked on the Digits Test, which test does not seem to have been employed previously for that purpose.

CONCLUSIONS

Any conclusions drawn from this study must necessarily be limited in scope by the type of group tested. That is, they are applicable only within the mental and chronological age ranges covered by the experiment. Furthermore, it must be kept in mind that specific operational definitions have been given for the more important terms employed, and extension of these terms to include other similar phenomena may or may not be valid.

These thought tendencies are present in individuals with mental ages between 5-0 and 6-11:

1. Animism. Restriction of the concept "alive" to plants and animals or to those objects exhibiting spontaneous motion is rare.

2. Juxtaposition. Confusion and inappropriateness often result when subjects are asked to verbalize a cause and effect relation by completing a sentence that includes the word "because."

3. Lack of relativism. Those who know right from left are unable to recognize the possibility of either of these positions existing apart from themselves as centers of reference.

4. Inferiority at abstraction. They exhibit a marked inability to shift from one aspect of a situation to another, as in changing the classificatory basis of grouped objects.

The above characteristics are products of the mental age level. They are not manifestations of any other single tendency (such as

ego-centricity or autistic thinking), for they show only random relationship to each other when the mental age level is constant. They are not products of experience, for individuals within this mental age range but of advanced chronological age do not show any difference in thought tendency. The only effect observable is a tendency for juxtaposition to occur more frequently among individuals of more advanced chronological ages.

Aments are inferior to children of the same mental age level on tests of abstraction. This inferiority is most marked on the test at year 7 of the revised Stanford-Binet Intelligence Test which requires reversing of digits.

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APPENDIX I

Presented herewith in tabular form are all of the data which were obtained by the experimenter for the purpose of this study. For reasons of expediency, the columns are headed with letters only. The key for interpretation of these column headings is given below:

A. Code name. Each individual was given a code name based in part upon the place at which the experimentation was performed. Those who were inmates of the State Colony were designated by the letter "C"; those who were students at the Jones First Grade, by the letter "J"; those enrolled at the Platt Kindergarten, by the letter "P" Individuals within the given letter groups were assigned numbers serially. For the aments these numbers were based on chronological age. For the children, they were based on the first letter in the last name.

B. Chronological age in years and months.

C. Mental age in years and months.

D. Intelligence quotient.

E. Sex.

F. Chronological age at the time of institutionalization.

G. Duration of institutionalization in years and months.

H. Stage of animism.

I. Frequency of juxtaposition.

J. Stage of relativism.

K. Number of groupings on Pencils Test.

L. Number of verbal interpretations of groupings on Pencils Test.

M. Number of groupings on Figures Test.

N. Number of verbal interpretations of groupings on Figures Test.

O. Number of groupings on Beads Test.

P. Number of verbal interpretations of groupings on Beads Test.

Q. Result on Digits Test (Test 4, Year 7, Form M, Terman-Merrill Revision of the Stanford-Binet Intelligence Test). "y" indicates the item was passed; "x", that it was failed; "o", that it was not considered because the subject was unable to pass any items at the seven-year level on the Binet Test.

Complete Data on All Children

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
P-2	4-5	5-5	123	F	-	-	NC	0	0	1	2	2	2	1	2	x
P-5	4-8	5-2	111	F	-	-	x	4	1	1	2	2	2	1	2	o
P-1	4-8	6-4	136	F	-	-	NC	2	0	1	2	2	2	1	2	x
P-16	4-8	5-8	121	F	-	-	NC	0	0	1	2	2	2	1	2	o
P-12	4-10	5-10	121	F	-	-	NC	0	1	2	2	2	2	1	2	x
P-6	4-11	5-7	114	F	-	-	NC	2	0	1	1	1	1	1	1	o
P-4	4-11	5-7	114	M	-	-	1	0	0	1	2	2	2	2	2	v
P-8	5-1	6-10	134	M	-	-	2	2	1	2	2	2	2	1	2	v
P-9	5-1	5-6	108	M	-	-	NC	1	0	1	2	1	2	1	2	x
P-3	5-2	6-2	119	M	-	-	4	1	1	1	2	1	2	1	2	x
P-14	5-2	6-2	119	M	-	-	1	1	0	1	2	1	2	1	2	v
P-7	5-2	6-6	126	M	-	-	4	0	0	1	2	2	2	1	2	v
P-15	5-3	6-6	124	F	-	-	2	0	1	1	2	2	2	2	2	x
J-18	5-3	6-0	114	M	-	-	4	0	1	1	2	1	1	1	2	v
P-18	5-4	6-3	117	F	-	-	2	0	1	1	2	1	2	1	2	x
P-13	5-5	6-0	111	M	-	-	2	1	0	1	2	2	2	1	2	x
P-17	5-5	6-6	120	F	-	-	1	0	1	1	2	2	2	1	2	v
J-22	5-6	6-6	118	M	-	-	4	1	2	1	2	1	2	1	2	v
J-15	5-7	5-7	100	M	-	-	NC	0	1	1	2	1	2	1	2	x
J-7	5-7	6-0	107	F	-	-	2	0	1	1	2	2	2	1	2	x
J-14	5-8	6-6	115	F	-	-	1	1	1	2	2	2	2	1	2	v
J-21	5-8	6-8	118	M	-	-	1	0	1	1	2	2	2	1	2	v
P-10	5-8	6-6	115	M	-	-	2	0	0	1	2	1	2	1	2	x
J-17	5-8	6-8	118	F	-	-	2	0	1	1	2	1	2	1	2	v
J-8	5-9	6-2	107	M	-	-	2	0	1	1	2	1	2	1	2	x
P-11	5-9	6-8	116	M	-	-	4	2	1	1	2	2	2	2	2	v
J-4	5-10	5-9	99	M	-	-	1	1	0	2	2	1	2	1	2	x
J-1	5-10	6-10	117	M	-	-	2	1	0	1	2	2	2	1	2	v
J-2	5-10	6-6	111	M	-	-	2	0	0	1	2	1	2	1	2	v
J-24	5-10	6-6	111	M	-	-	x	1	1	1	2	1	2	1	2	v
J-19	5-10	6-2	106	F	-	-	2	2	0	2	2	1	2	1	2	v
J-11	5-11	6-2	104	F	-	-	2	0	0	1	2	1	2	1	2	x
J-10	5-11	6-4	107	M	-	-	2	1	0	1	2	1	2	1	2	v
J-3	6-0	6-6	108	F	-	-	x	0	1	1	2	2	2	1	2	v
J-12	6-0	6-4	106	M	-	-	x	0	1	1	2	1	2	1	2	x
J-16	6-1	6-6	107	F	-	-	2	0	0	1	2	1	2	1	2	x
J-5	6-2	6-2	100	M	-	-	1	0	1	2	2	1	2	1	2	x
J-20	6-3	6-6	104	M	-	-	1	3	0	1	2	2	2	1	2	x
J-9	6-5	6-8	104	M	-	-	2	0	1	1	2	2	2	1	2	v
J-6	6-6	6-0	92	M	-	-	2	0	1	1	2	1	2	1	2	x
J-23	6-7	6-8	101	M	-	-	NC	2	1	1	2	1	2	1	2	x
J-13	6-9	6-8	102	M	-	-	2	0	1	1	2	2	2	1	2	v

Complete Data on All Aments

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
C-1	17-4	6-4	42	F	9-11	7-5	2	2	1	2	2	1	2	2	2	o
C-2	17-4	6-8	44	M	10-2	7-4	3	1	1	1	2	1	2	2	2	x
C-3	17-5	6-8	44	M	15-8	2-10	3	1	1	2	2	2	2	1	2	v
C-4	18-2	6-4	42	M	5-7	12-7	3	4	1	1	2	1	2	1	2	x
C-5	18-2	6-0	40	F	15-1	3-1	2	1	0	1	2	1	2	1	2	x
C-6	18-6	6-6	43	M	11-10	6-8	3	4	1	1	2	1	1	1	2	x
C-7	20-5	5-8	38	M	12-9	7-8	3	1	1	1	1	1	1	1	1	o
C-8	20-11	6-6	43	F	16-4	4-7	2	1	1	2	2	2	2	2	2	x
C-9	21-1	6-11	46	F	16-4	4-8	2	0	1	1	2	1	2	1	2	x
C-10	21-11	5-7	37	M	11-3	10-8	x	2	1	1	1	2	1	1	1	o
C-11	22-2	6-4	42	M	9-8	12-6	1	1	2	2	2	1	2	2	2	x
C-12	22-4	5-4	36	F	4-8	17-9	NC	4	1	1	1	0	1	0	1	o
C-13	22-6	6-0	40	F	18-4	4-2	2	2	1	1	2	1	2	1	2	x
C-14	23-1	5-10	39	M	12-7	10-6	2	2	1	1	1	1	1	1	2	x
C-15	23-2	6-6	43	M	10-2	13-1	2	1	1	1	2	1	2	1	2	x
C-16	23-6	5-1	34	F	17-6	6-1	x	1	1	1	2	1	2	1	2	o
C-17	23-8	6-8	44	F	12-11	10-9	x	0	0	1	2	1	2	1	2	x
C-18	23-9	6-4	42	M	15-6	8-4	1	1	1	1	1	1	1	1	1	x
C-19	24-0	5-8	38	F	7-2	16-10	1	3	0	1	1	1	2	1	2	o
C-20	25-3	6-4	42	F	15-11	9-4	2	4	1	1	1	1	1	1	1	x
C-21	25-9	6-6	43	M	12-9	13-1	1	5	2	1	2	1	2	1	2	v
C-22	25-9	6-6	43	F	15-1	10-9	2	0	1	1	2	1	2	2	2	x
C-23	26-3	6-4	42	M	22-0	4-3	4	2	1	1	2	2	2	1	2	x
C-24	26-8	6-4	42	F	8-10	17-10	x	3	1	1	2	2	2	2	2	x
C-25	26-11	5-10	39	M	23-11	3-0	1	3	1	1	1	0	1	1	1	x
C-26	27-6	6-8	44	F	15-11	11-7	2	3	1	1	2	2	2	2	2	x
C-27	27-7	6-0	40	F	12-3	15-4	x	4	1	1	2	1	1	1	1	x
C-28	28-1	5-2	34	F	23-3	4-10	2	2	1	0	2	0	1	1	1	o
C-29	28-5	5-8	38	F	12-7	15-10	1	4	1	1	1	1	1	1	2	o
C-30	28-10	6-4	42	F	19-0	9-11	2	3	1	1	2	1	2	1	1	x
C-31	28-11	5-6	37	M	18-3	10-9	4	3	1	1	2	1	2	1	2	o
C-32	30-4	5-8	38	M	15-0	15-4	1	2	1	1	1	1	1	1	1	x
C-33	33-11	5-10	39	F	21-2	12-9	NC	3	0	1	2	1	2	2	2	x
C-34	35-0	5-3	35	F	30-3	4-9	x	2	1	1	1	0	2	1	2	o
C-35	36-9	6-6	43	F	20-6	16-3	NC	3	0	1	2	1	2	2	2	x
C-36	37-0	5-3	35	F	18-4	18-8	1	4	0	1	1	1	1	1	1	o
C-37	38-0	6-2	41	F	24-5	13-7	x	3	2	1	2	1	2	1	2	x
C-38	39-0	6-2	41	M	19-0	20-0	1	3	1	1	2	1	2	1	2	x
C-39	39-0	6-4	42	M	19-5	19-7	2	2	1	1	2	1	2	1	2	x
C-40	42-3	6-4	42	F	22-7	19-8	2	0	2	1	2	1	2	1	2	x
C-41	44-5	6-0	40	F	31-1	13-4	x	3	0	1	2	1	2	1	2	x
C-42	45-5	5-6	37	F	32-9	12-8	NC	4	0	1	2	1	2	1	2	o

APPENDIX II

On the following pages is reproduced the type of record booklet used by the experimenter in this study. The booklets actually used were in mimeographed form and were stapeled together.

Animism Stage	Juxtaposition Frequency	Relativism Stage	Abstraction Grouping	Abstraction Interpretation
			"	"

NAME .....

Place.....

C. Age.....

M.A. .....

I.Q. .....

Length Institutionalization .....

Age at Institutionalization .....

Home.....

Descent.....

Sex.....

Comments:

ANIMISM

Stage _____

	Living or Dead; Why?	L- or D- when moving?	Self?
1.	Stone		
2.	Knife		
3.	Mirror		
4.	Button		
5.	Comb		
6.	Chair		
7.	Dish		
8.	Watch		
9.	River		
10.	Clouds		
11.	Moon		
12.	Wind		

ANIMISM (continued)

	Living or Dead; Why?	L- or D- when moving?	Self?
13.	Lightning		
14.	Pencil		
15.	Dog		
16.	Bird		
17.	Bug		
18.	Tree		
19.	Flower		
20.	Grass		

JUXTAPOSITION Frequency_____

_____ 1. The stick is broken because:

_____ 2. The boy hurt his leg because:

_____ 3. I went to town because:

_____ 4. The boy lost his pencil because:

_____ 5. He fell off his horse because:

RELATIVISM

Stage_____

_____ 1. Show me your

R- hand _____ L-hand _____ R-Leg _____ L-leg _____

_____ 2. Show me my

R- hand _____ L- hand _____ R- Leg _____ L-Leg _____

_____ 3. Is the Pencil to the right or left? _____

Is the Nickel to the right or left? _____

_____ 4. Is the Nickel in my right hand or my left hand? _____

Is the Watch in my right or my left hand? _____

_____ 5. Is the Pencil to the left or right of the Watch? _____

Is the Pencil to the left or right of the Nickel? _____

Is the Watch to the left or right of the Nickel? _____

Is the Watch to the left or right of the Pencil? _____

Is the Nickel to the left or right of the Pencil? _____

Is the Nickel to the left or right of the Watch? _____

ABSTRACTION

No. Groupings _____

1. Beads

No. Interpretations_____

Grouped on Basis of:

_____Color

_____Form

_____

Correct Interpretation of:

_____Color

_____Form

_____

ABSTRACTION

No. Groupings _____

2. Pencils

No. Interpretations_____

Grouped on Basis of:

_____Color

_____Size

_____

Correct Interpretation of:

_____Color

_____Size

_____

ABSTRACTION

No. Groupings_____

3. Figures

No. Interpretations_____

Grouped on Basis of:

_____Color

_____Form

_____

Correct Interpretation of:

_____Color

_____Form

_____

AUTOBIOGRAPHY

E. Terry Prothro was born December 11, 1919, in Robeline, Louisiana. After appropriate training in various grammar schools of the State, he entered Poydras High School of New Roads, Louisiana. He was graduated from there in May, 1935, and entered Louisiana College, Pineville, the following September. He was graduated in June, 1939, with a major in psychology and a minor in mathematics. In September of that year he entered Louisiana State University, where he was a candidate for the Master of Arts degree in psychology. This degree was received in June, 1940. In the fall he returned to Louisiana State University, where he began work on the doctor's degree. The summer of 1941 he served as extern at the State Colony and Training School, Alexandria, and performed much of the research connected with his doctoral dissertation. He reentered the University at the beginning of the 1941-1942 session, and is now a candidate for the Doctor of Philosophy degree in psychology.

EXAMINATION AND THESIS REPORT

Candidate: Edwin Terry Prothro

Major Field: Psychology

Title of Thesis: A Comparative Study of Certain Characteristics of Thinking in Adult Aments and Normal Children

Approved:

Paul C. Young
Major Professor and Chairman

Wm O Seroggs
Dean of the Graduate School

EXAMINING COMMITTEE:

Wayne Dennis

Edgar A. Doll

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Donald Dresson

Date of Examination:

May 1, 1942